

## PATENT SPECIFICATION

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- (21) Application No. 54605/74 (22) Filed 18 Dec. 1974  
 (31) Convention Application No. 175 522  
 (32) Filed 20 Dec. 1973 in  
 (33) German Dem. Rep. (DL)  
 (44) Complete Specification published 10 June 1977  
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     B3Q 3



(54) METHOD OF MANUFACTURING A HOLLOW RIVET  
ON A CAN LID

(71) We, VEB KOMBINAT UMFORMTECHNIK ERFURT, of 1 Schwerborner Strasse, 501 Erfurt, German Democratic Republic, a Corporation organised under the laws of the German Democratic Republic, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of manufacturing a hollow rivet on a can lid for attaching an apertured tear-open pull tab or pull ring to the can lid, said rivet being formed from the lid material.

From the German AS 1,452,637 it is known that after forming a bulge of hemispherical shape and rivet shaping, during the rivetting the rivet head is formed by a weakening of the upper side of the rivet head by extrusion. A further method according to the German OS 1,517,992 provides for the use of extrusion for manufacturing the entire hollow rivet. Both these previously known methods suffer from the disadvantage that due to the high local pressures during the extrusion the lacquer layer present on the can lid tears and consequently no corrosion resistance exists with respect to the contents of the can.

A further method according to German OS 1,602,545 comprises first forming a large hemispherical doming. From this hemispherical doming, the hollow rivet is formed in a further work stage with a plurality of consecutive dies. It is disad-

of the lid surface of other tear-open systems.

It is further known according to German OS 2,164,488 to make the material required for the hollow rivet available by forming an additional ring-shaped groove in addition to bulging. The disadvantage of this method lies in the fact that the weakening of the sheet metal thickness resulting in the groove region comes to lie just at the transition to the hollow rivet, where in any case the main stress occurs during the actuation of the tear-open pull tab or ring and a premature tearing out of the rivet part from the can lid may occur without the separation of the part of the can lid which is to be torn open having occurred at the tear-open line.

The invention aims at obviating the foregoing disadvantages. The underlying aim of the invention is to develop a method of manufacturing a hollow rivet on a can lid, whereby any weakening of the material thickness occurs in the unstressed upper side of the rivet head, without the lacquer layer being destroyed.

Accordingly, the present invention consists in a method of manufacturing a cylindrical hollow rivet on a can lid for attaching an apertured tear-open pull tab or ring to the can lid, which comprises forming a frusto-conical bulge in the can lid and shaping said bulge into a cylindrical hollow rivet by using the aperture in the pull tab or ring as a drawing die.

The present invention also consists in a method of attaching an apertured tear-open pull tab or ring to a can lid by forming a

## SPECIFICATION NO 1476227

By a direction given under Section 17 (1) of the Patents Act 1949 this application proceeded in the name of VEB KOMBINAT UMFORMTECHNIK 'HERBERT WARNKE' ERFURT, of 1 Schwerborner Strasse, 50 Erfurt, German Democratic Republic, a Corporation organised under the laws of the German Democratic Republic.

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 ON A CAN LID

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This invention relates to a method of manufacturing a hollow rivet on a can lid for attaching an apertured tear-open pull tab or pull ring to the can lid, said rivet being formed from the lid material.

From the German AS 1,452,637 it is known that after forming a bulge of hemispherical shape and rivet shaping, during the rivetting the rivet head is formed by a weakening of the upper side of the rivet head by extrusion. A further method according to the German OS 1,517,992 provides for the use of extrusion for manufacturing the entire hollow rivet. Both these previously known methods suffer from the disadvantage that due to the high local pressures during the extrusion the lacquer layer present on the can lid tears and consequently no corrosion resistance exists with respect to the contents of the can.

A further method according to German OS 1,602,545 comprises first forming a large hemispherical doming. From this hemispherical doming, the hollow rivet is formed in a further work stage with a plurality of consecutive dies. It is disadvantageous here that owing to the large hemispherical doming the rivet can be manufactured only in the centre or approximately in the centre of the lid. This central arrangement means that in the case of a completely tear-open lid, the lid surface must be removed spirally. Due to the length of the tear-open strip a greater risk of injury exists than in the case of the closed removal

of the lid surface of other tear-open systems.

It is further known according to German OS 2,164,488 to make the material required for the hollow rivet available by forming an additional ring-shaped groove in addition to bulging. The disadvantage of this method lies in the fact that the weakening of the sheet metal thickness resulting in the groove region comes to lie just at the transition to the hollow rivet, where in any case the main stress occurs during the actuation of the tear-open pull tab or ring and a premature tearing out of the rivet part from the can lid may occur without the separation of the part of the can lid which is to be torn open having occurred at the tear-open line.

The invention aims at obviating the foregoing disadvantages. The underlying aim of the invention is to develop a method of manufacturing a hollow rivet on a can lid, whereby any weakening of the material thickness occurs in the unstressed upper side of the rivet head, without the lacquer layer being destroyed.

Accordingly, the present invention consists in a method of manufacturing a cylindrical hollow rivet on a can lid for attaching an apertured tear-open pull tab or ring to the can lid, which comprises forming a frusto-conical bulge in the can lid and shaping said bulge into a cylindrical hollow rivet by using the aperture in the pull tab or ring as a drawing die.

The present invention also consists in a method of attaching an apertured tear-open pull tab or ring to a can lid by forming a hollow rivet from the lid material, comprising the steps of forming a frusto-conical bulge in the lid, shaping said bulge into a cylindrical hollow rivet by using the aperture in the pull tab or ring as a drawing die, and upsetting the head of the hollow rivet over the peripheral edge of the aperture in the pull tab or ring.

Advantageously, the diameter of the

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aperture in said pull tab or ring substantially corresponds to the mean diameter of the frusto-conical bulge.

These methods, besides eliminating the above-mentioned disadvantages, also procure the following advantage. The pull tab or ring can be centered far better by the frusto-conical bulge, and when pressed on acquires a press fit which ensures a definite fixing in position. Furthermore the tool wear which occurs is considerably reduced by the use of the aperture in the pull tab or ring as drawing die.

In order that the invention may be more readily understood, reference is made to the accompanying drawings which illustrate diagrammatically and by way of example one embodiment thereof, and in which:

Fig. 1 shows the formation of a centrally radiused bulge,

Fig. 2 shows the formation of a frusto-conical intermediate shape,

Fig. 3 shows the formation of a cylindrical hollow rivet in the initial phase,

Fig. 4 shows the same in the final phase, and

Fig. 5 shows the upsetting of the rivet head.

As Fig. 1 shows, a can lid 1 of sheet metal is clamped between a die 4 and a counter support 5 and a punch 3 is forced in the direction of the die 4 so that a bulge is produced, with a radiused zone 6 having the greatest sheet metal thickness reduction and a frusto-conical portion 2. The zone 6 is identical with a least stressed zone 18 (Fig. 5) on the upper side of a finally shaped cylindrical hollow rivet 16. In a further tool (Fig. 2) comprising a movable drawing die 9, a stationary support element 10 and a stationary punch 8, which accommodate the can lid 1 with the shaped bulge 2, 6, the can lid 1 is placed on to the stationary tool parts 8 and 10. When the drawing die 9 travels downwards (not shown) a frusto-conical intermediate shape 7 is formed. The upper diameter  $d$  of this shape is smaller and its lower diameter  $D$  greater than an aperture 12 (Fig. 3) of a pull tab or ring 11 to be secured to the lid 1.

In a third tool (Fig. 3), comprising a stationary counter punch 15 and a punch housing 17, and a movable ram 13, the frusto-conical intermediate shape 7 is placed on the counter punch 15 and punch housing 17, the pull tab or ring 11 is placed over it so that the aperture 12 rests in the zone of the mean diameter of the frusto-conical intermediate shape 7. The ram 13, which is followed by a rivet punch 14 arranged in the

ram 13, is then placed upon the pull tab or ring 11 and presses the latter downwards so that, as Fig. 4 shows, a cylindrical hollow rivet 16 is produced from the frusto-conical intermediate shape 7. As Fig. 5 shows, the rivet punch 14 is then forced farther downwards, so that a rivet head is formed by upsetting the sheet metal against the counter punch 15 over the edge of the aperture 12 without any further reduction of sheet metal thickness occurring by extrusion. Hence the most weakened zone 6 in the bulge lies in the upper side of the rivet head in the zone of the least stress 18.

#### WHAT WE CLAIM IS:—

1. A method of manufacturing a cylindrical hollow rivet on a can lid for attaching an apertured tear-open pull tab or ring to the can lid, which comprises forming a frusto-conical bulge in the can lid, and shaping said bulge into a cylindrical hollow rivet by using the aperture in the pull tab or ring as a drawing die.

2. A method of attaching an apertured tear-open pull tab or ring to a can lid by forming a hollow rivet from the lid material, comprising the steps of forming a frusto-conical bulge in the lid, shaping said bulge into a cylindrical hollow rivet by using the aperture in the pull tab or ring as a drawing die, and upsetting the head of the hollow rivet over the peripheral edge of the aperture in the pull tab or ring.

3. A method as claimed in claim 1 or 2, wherein the diameter of the aperture in said pull tab or ring substantially corresponds to the mean diameter of the frusto-conical bulge.

4. A method as claimed in claim 1, 2 or 3, wherein the frusto-conical bulge is formed by shaping a bulge which has a radius at a central portion and a frusto-conical portion adjoining said central portion.

5. A method of manufacturing a cylindrical hollow rivet on a can lid, substantially as herein described with reference to and as shown in the accompanying drawings.

6. A method of attaching an apertured tear-open pull tab or ring to a can lid, substantially as herein described with reference to and as shown in the accompanying drawings.

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COMPLETE SPECIFICATION

2 SHEETS

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the Original on a reduced scale

Sheet 1

Fig. 1

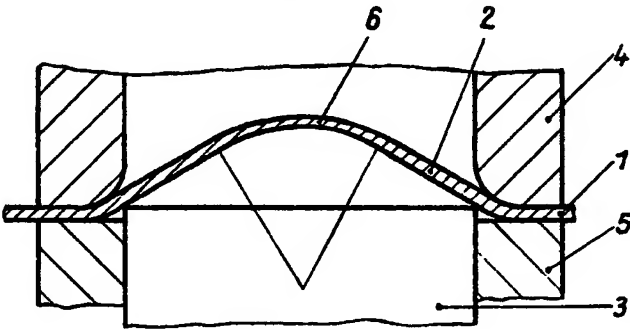
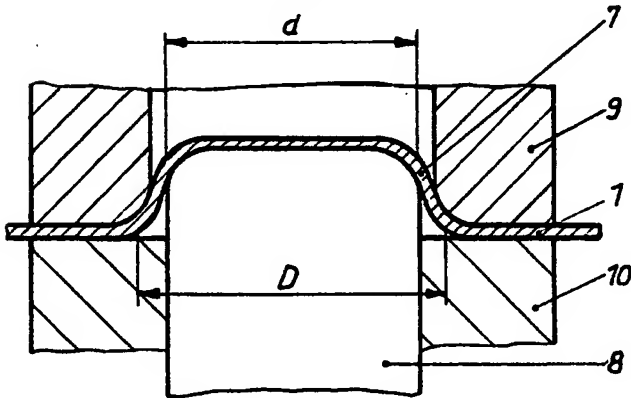


Fig. 2



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Sheet 2

Fig.3

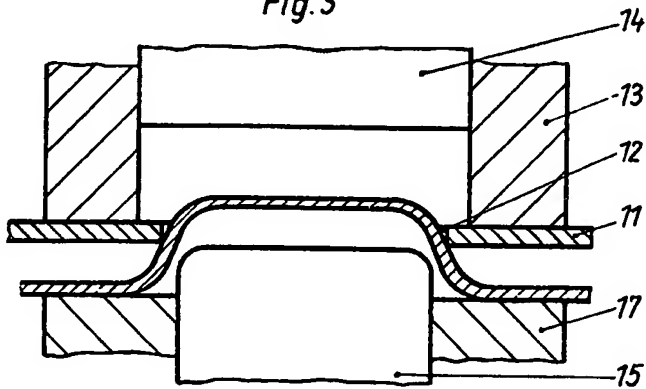


Fig.4

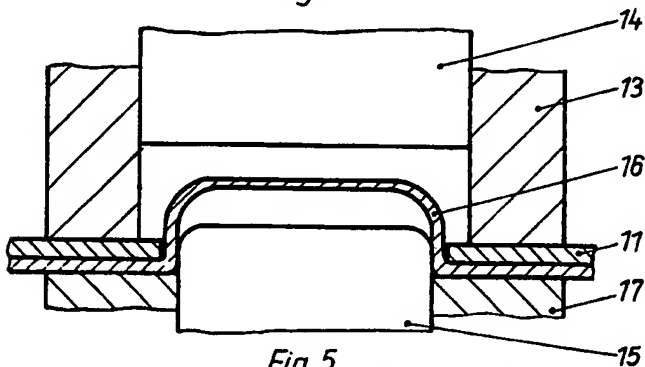


Fig.5

